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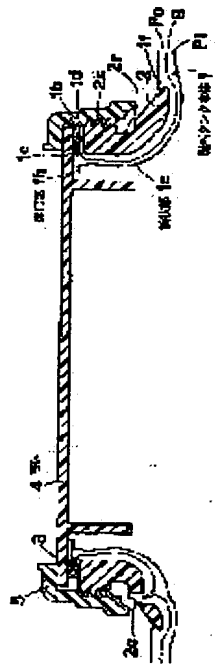
(54) OPENING PART STRUCTURE OF FUEL TANK AND METHOD OF MAKING FUEL TANK HAVING THIS OPENING PART STRUCTURE

(57)Abstract:
PROBLEM TO BE SOLVED: To surely prevent fuel from permeating through a resin member in an opening part, relating to a fuel tank formed of a resin member having a plurality of layers.
SOLUTION: A fuel tank main unit 1 is formed by blow molding a resin member having a plurality of layers, and an opening part 1h is integrally formed. A tubular part 1e extended outward the fuel tank main unit in the opening part and an overlapped part 1d extending a bending part 1b in a direction diametrically spreading the opening part from a tip end of this tubular part to have an external surface in parallel to an opening surface of the opening part are formed. A compression part 1c is formed by compressing partly the overlapped part 1d. This compression part 1c, by generating a smooth surface while thickness of the resin member is thinned by compression, can ensure good seal performance. In addition, in the case that the compression part 1c constitutes an annular groove, a seal member 3 can be arranged.



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CLAIMS

[Claim(s)]
[Claim 1] In the opening structure of the fuel tank which forms opening in the fuel tank body formed by the resin member which has two or more layers in one, and grows into it The tubed part which extends to the method of the outside of said fuel tank body in said opening, and the polymerization section which the bending section extends in the direction which expands the diameter of said opening from the tip of this tubed part, and has external surface parallel to the effective area of said opening, Opening structure of the fuel tank characterized by having the compression zone which compressed this a part of polymerization section [at least] in the direction perpendicular to said effective area.
[Claim 2] Opening structure of the fuel tank according to claim 1 characterized by providing the annular member arranged so that said opening may be surrounded and said polymerization section and said tubed part may be contacted.
[Claim 3] Opening structure of the fuel tank according to claim 1 characterized by said compression zone constituting the circular sulcus located in the direction outside of a path of said opening to said tubed part.
[Claim 4] While carrying out blow molding of the resin member which has two or more layers and forming a fuel tank body In the manufacture approach of the fuel tank which forms opening in one at the time of the blow molding of said fuel tank body The tubed part which extends to the method of the outside of said fuel tank body in said opening is formed. After bulging this a part of tubed part [at least] on the direction outside of a path, while forming the bending section which compresses the bulge section and is bent on the direction outside of a path of said opening and forming the polymerization section which has external surface parallel to the effective area of said opening The manufacture approach of the fuel tank characterized by compressing this a part of polymerization section [at least], and forming a compression zone.

[Claim 5] While carrying out blow molding of the resin member which has two or more layers and forming a fuel tank body So that the part which should form said opening may be surrounded in the manufacture approach of the fuel tank which forms opening in one Blow molding is performed in the condition of having arranged the annular member of a cross-section U shape opened on the direction outside of a path. After bulging the point which forms said tubed part inside said annular member, and is not surrounded by said annular member of said tubed part on the direction outside of a path, The manufacture approach of the fuel tank characterized by compressing this a part of polymerization section [at least], and forming a compression zone while forming the bending section which compresses the bulge section and is bent on the direction outside of a path of said opening and forming the polymerization section which has external surface parallel to the effective area of said opening.
[Claim 6] The manufacture approach of the fuel tank according to claim 4 or 5 characterized by forming said compression zone in the direction outside of a path of said opening to said tubed part.
[Claim 7] The manufacture approach of the fuel tank according to claim 4 or 5 characterized by forming said compression zone inside [direction of path] said opening to said tubed part.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the opening structure and its manufacture approach of the fuel tank which forms opening in one while it carries out blow molding of the resin member which has two or more layers especially about the manufacture approach of a fuel tank of having the opening structure and its opening structure of a fuel tank and forms a fuel tank body.
[0002]
[Description of the Prior Art] In the fuel tank carried in an automobile etc., while resinification progresses, carrying out blow molding of the resin member and forming a fuel tank body, the approach of forming opening in one spreads, and the fuel tank made of resin which has opening of desired structure has spread. About the opening structure of such a fuel tank, it is indicated by JP,4-7925,U, for example, the conventional structure is indicated in the Fig. 3, and the structure which held down the height of an opening peripheral wall to the Fig. 1 is indicated. In this official report, it is supposed that a sufficiently big capacity can be secured to the limited overall height by preparing the engagement sections, such as a nut, in the lid attachment base joined to the tank body, making engagement components, such as a bolt, engage with this, and covering it the structure fixed to a tank body. Moreover, the same structure as a thing given [as a conventional technique] also in the patent No. 2906701 official report at the above-mentioned official report is indicated.
[0003] On the other hand, about the resin member which constitutes a fuel tank, the resin member which has two or more layers, for example like a publication in JP,61-83509,U is used. The multilayer blow molding tank using the multilayer plate member which made the component of two or more sheets rival through an adhesives layer is indicated by this official report.

[0004]
[Problem(s) to be Solved by the Invention] Like the publication to above-mentioned JP,61-83509,U, when manufacturing the fuel tank made of resin, the resin member which has two or more layers is used. This is what joined with adhesives etc. attachment components holding the reinforcement as a fuel tank on the strength, such as high density polyethylene, and the barrier material which prevents transparency of a fuel, by carrying out blow molding of this resin member, a fuel tank is formed and opening is also formed in coincidence. And although opening will be covered with a lid like a publication in an official report shown above, two or more layers may expose the end face of opening to the tank book inside of the body. In this case, there is a possibility that a fuel may be revealed outside through the attachment component of the outermost layer of a resin member on the strength.
[0005] In JP,4-7925,U shown above, although infixing packing and joining together with engagement components, such as a bolt, is proposed, on the occasion of junction of a lid, high packing, a high bolt, etc. of seal nature are needed separately. And even if it used packing excellent in the transparency prevention function, we are anxious about leakage of the fuel through the outermost layer of a resin member.
[0006] Then, this invention makes it a technical problem to offer the opening structure of the fuel tank which can prevent certainly that a fuel penetrates through a resin member in opening about the fuel tank formed by the resin member which has two or more layers.
[0007] Moreover, this invention makes it another technical problem to offer the manufacture approach of a fuel tank of having the opening structure where transparency prevention of a fuel can be ensured in the manufacture approach of the fuel tank which forms opening in one while it carries out blow molding of the resin member which has two or more layers and forms a fuel tank body.
[0008]
[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the opening structure of the fuel tank of this invention In the opening structure of the fuel tank which forms opening in the fuel tank body formed by the resin member according to claim 1 which has two or more layers like in one, and grows into it The tubed part which extends to the method of the outside of said fuel tank body in said opening, and the polymerization section which the bending section extends in the direction which expands the diameter of said opening from the tip of this tubed part, and has external surface parallel to the effective area of said opening, Suppose that it has the compression zone which compressed this a part of polymerization section [at least] in the direction perpendicular to said effective area.

Therefore, it continues all over said polymerization section, and is good also as said compression zone.

[0009] Furthermore, it is good also as providing the annular member according to claim 2 arranged so that said opening may be surrounded and said polymerization section and said tubed part may be contacted like. Said compression zone is good also as constituting the circular sulcus according to claim 3 located in the direction outside of a path of said opening to said tubed part like. And it is good to arrange a seal member in said circular sulcus.

[0010] Moreover, while the manufacture approach of the fuel tank of this invention carries out blow molding of the resin member according to claim 4 which has two or more layers like and forms a fuel tank body In the manufacture approach of the fuel tank which forms opening in one at the time of the blow molding of said fuel tank body The tubed part which extends to the method of the outside of said fuel tank body in said opening is formed. After bulging this a part of tubed part [at least] on the direction outside of a path, while forming the bending section which compresses the bulge section and is bent on the direction outside of a path of said opening and forming the polymerization section which has external surface parallel to the effective area of said opening Suppose that this a part of polymerization section [at least] is compressed, and a compression zone is formed.

[0011] Furthermore, while the manufacture approach of the fuel tank of this invention carries out blow molding of the resin member according to claim 5 which has two or more layers like and forms a fuel tank body So that the part which should form said opening may be surrounded in the manufacture approach of the fuel tank which forms opening in one Blow molding is performed in the condition of having arranged the annular member of a cross-section U shape opened on the direction outside of a path. After bulging the point which forms said tubed part inside said annular member, and is not surrounded by said annular member of said tubed part on the direction outside of a path, While forming the bending section which compresses the bulge section and is bent on the direction outside of a path of said opening and forming the polymerization section which has external surface parallel to the effective area of said opening, it is good also as compressing this a part of polymerization section [at least], and forming a compression zone.

[0012] said compression zone -- being according to claim 6 -- even if it forms in the direction outside of a path of said opening to said tubed part like -- being according to claim 7 -- you may form inside [direction of path] said opening to said tubed part like.

[0013]

[Embodiment of the Invention] Hereafter, the desirable operation gestalt of this

invention is explained with reference to a drawing. Drawing 1 shows 1 operation gestalt of the opening structure of the fuel tank of this invention, and shows some of the cross sections to drawing 2 . The fuel tank of this operation gestalt is later mentioned about the manufacture approach, although 1h of openings is formed in one while the fuel tank body 1 is formed by carrying out blow molding of the resin member which has two or more layers.

[0014] If the configuration of about 1h of openings is explained first, as shown in drawing 1 and drawing 2 , 1d of polymerization sections which bending section 1b extends in the direction which expands the diameter of 1h of openings from the tip of tubed part 1e which extends to a way outside the fuel tank body 1 in 1h of openings, and this tubed part 1e, and have external surface parallel to the effective area Sh which is 1h of openings is formed. And 1d of a part of polymerization sections is compressed, and compression zone 1c is formed. In addition, hatching of the resin member which constitutes the fuel tank body 1 in drawing 1 is omitted.

[0015] As it expands to drawing 2 and is shown, the interlayer B formed with the barrier material between the outer layers Po and inner layers Pi which were formed by the attachment component on the strength is infixed, and the resin member which constitutes the fuel tank body 1 is a resin member of the multilayer structure which has two or more layers to which these were joined by adhesive resin. As an attachment component on the strength used with this operation gestalt, ultrahigh-molecular-weight (high density) polyethylene is used, and EVOH (ethylene and resin which vinyl alcohol copolymerized) is used as a barrier material, for example. In addition, these ingredients may not be limited in this invention, and as a barrier material, as long as it is the ingredient which has the gas barrier property which can prevent transparency of fuels, such as a gasoline, certainly, what kind of thing may be used.

[0016] Since bending section 1b is bent inside (opening side) as an enlarged section is shown in drawing 2 , even if a fuel penetrates a inner layer Pi, it will be appropriately intercepted in the barrier layer B of bending section 1b. And compression zone 1c constitutes a circular sulcus, and especially the thickness of an outer layer Po compares it with it of tubed part 1e, and it is formed quite thinly. Thus, since the thickness of an outer layer Po is thin by compression zone 1c and passage is narrow, it becomes the resistance at the time of a fuel penetrating from opening end-face 1p. On the other hand, in the opening structure where it does not have compression zone 1c, since the opening end face (equivalent to 1p of drawing 2) of the resin member of multilayer structure can be open for free passage with outer space as it is, even if a seal member is arranged between a lid 4 and a holddown member 5, there will be a

possibility that a fuel may penetrate through an outer layer Po. although bending section 1b may moreover be theoretically reached through the thin part of compression zone 1c through an outer layer Po with this operation gestalt from the opening end-face 1p side -- actual -- **** -- it is small and is the amount which can be disregarded substantially.

[0017] Furthermore, while it is arranged so that the annular member 2 may surround 1h of openings, and the inside contacts the lateral surface of tubed part 1e, it has fixed so that the inferior surface of tongue whose upper limit side is 1d of polymerization sections may be contacted. The annular member 2 also has the U-shaped cross section opened on the direction outside of a path by the product made of resin, and as shown in drawing 3 and drawing 4 , it is formed. That is, crevice 2r is formed in a periphery and the both-ends side of shaft orientations is formed in parallel. In addition, 2s of thread parts is formed in the up lateral surface of drawing 4 , and two or more free passage holes (it represents and expresses with 2c) which cover the perimeter and carry out opening to shaft orientations so that clearly [drawing 3] are formed.

[0018] Thus, the constituted annular member 2 surrounds 1h of openings, as shown in drawing 1 and drawing 2 , it is arranged so that tubed part 1e and 1d of polymerization sections may be contacted, and it is joined by the outer layer Po in one. That is, a resin member invades in free passage hole 2c at the time of shaping, and it is fixed so that it may not rotate to tubed part 1e. Moreover, an outer layer Po extends and 1f of stop sections is formed so that a part of periphery edge of the annular member 2 may be covered.

[0019] In 1h of openings constituted as mentioned above, since compression zone 1c constitutes the circular sulcus If it equips with the annular holddown member 5 which has a thread part inside and screws in 2s of thread parts of the annular member 2 after holding the annular seal members 3, such as rubber, in compression zone 1c as shown in drawing 1 , and laying a lid 4 on it It is fixed so that a lid 4 may stick to the top face of 1d of polymerization sections through the seal member 3. Since the annular member 2 is being fixed at this time so that it may not rotate to tubed part 1e, it does not rotate, in case a holddown member 5 is screwed.

[0020] Since the fuel in a fuel tank serves as only a part which the exterior and the part which can be opened for free passage are the outer layers Po of the seal member 3, a lid 4, the 1d [of polymerization sections] contact section, and the resin members of multilayer structure, and was thinly formed in compression zone 1c structurally in the opening structure of the fuel tank of this operation gestalt by **(ing), transparency of a fuel can be prevented certainly. Since field roughness of the base

[especially] of compression zone 1c improves and it is a smooth field by compression, good seal nature is securable.

[0021] Drawing 5 and drawing 6 explain an example of the production process of a fuel tank which has the above-mentioned opening structure, and the multilayer parison PT which consisted of resin members of the above-mentioned multilayer structure is first arranged in metal mold D [D1 and] 2 in the forming cycle of drawing 5 . As a two-dot chain line shows to drawing 5 , metal mold D1 is directed in the vertical direction of drawing 5 movable to metal mold D2, and, inside, heights D1r and crevice D2r are formed, respectively. Heights D1r is formed in the configuration which can form compression zone 1c shown in drawing 2 , and crevice D2r is formed in the configuration which can hold the annular member 2. Furthermore, Spacer SP is arranged possible [an attitude to a perpendicular direction] to the shaft (namely, shaft of 1h of openings) of metal mold D1, and it functions as the ability of the annular member 2 to be held within crevice 2r of the annular member 2 at the time of a pressing operation. In addition, Spacer SP is constituted so that migration of metal mold D1 may be followed and it may move in the direction perpendicular to the shaft of metal mold D1. And separately, through the communicating tube (not shown), it is constituted so that pneumatic pressure or fluid pressure may be given inside the multilayer parison PT.

[0022] **(ing) and pneumatic pressure or fluid pressure being given in the multilayer parison PT, metal mold D1 slides to metal mold D2, and it drives to an annular member 2-way. Migration of metal mold D1 is followed, and Spacer SP drives in the perpendicular direction to the shaft of metal mold D1, and is held within crevice 2r of the annular member 2 at coincidence. Consequently, as shown in drawing 5 , while the multilayer parison PT bulges, bulge of the part which contacts the annular member 2 is controlled, and tubed part 1e is formed. Furthermore, as shown in drawing 6 , bending section 1b and 1d of polymerization sections are formed in a good configuration precision. Moreover, 1d of polymerization sections is compressed by heights D1r of metal mold D1, and compression zone 1c is formed of it. In addition, although 1g of covering devices is also formed at this time, this is removed behind.

[0023] Drawing 7 shows the opening structure of the fuel tank concerning other operation gestalten of this invention, continues all over 1d of polymerization sections, compresses it, and makes a compression zone the 1d of the whole polymerization section. Thus, good seal nature can be secured, without good seal nature being securable, and infixing a seal member separately, if the field roughness of the rear face of a lid 3 is still more suitable since the field roughness of the external surface (top face of drawing 7) of 1d of polymerization sections improves and it becomes a smooth

field by constituting.

[0024] Drawing 8 shows the opening structure of the fuel tank concerning the operation gestalt of further others of this invention, and is equipped with the annular member 2 in which 2t of projections was formed up, and if 1d of polymerization sections is compressed, compression zone 1cu will be formed in the inferior surface of tongue of 1d of polymerization sections. Thereby, since the thickness of an outer layer Po becomes thin by compression zone 1cu and passage becomes narrow, it becomes the resistance at the time of a fuel penetrating from opening end-face 1p. Moreover, since the field roughness of the external surface (top face of drawing 8) of 1d of polymerization sections of the compression zone 1cu upper part improves and it becomes a smooth field, good seal nature is securable.

[0025] Drawing 9 shows the opening structure of a fuel tank where it enabled it to remove easily covering device material 1g saved at the time of shaping, to the operation gestalt of drawing 8 of this invention, and compression zone 1ci is formed in 1d top face of polymerization sections inside [direction of path] 1h of openings at the time of compression. Thus, by giving shearing force to the compression zone 1ci part which became thin, covering device material 1g is easily removable.

[0026]

[Effect of the Invention] Since this invention is constituted as mentioned above, it does the following effectiveness so. Namely, it sets in the opening structure of the fuel tank of this invention. The tubed part according to claim 1 which extends to the method of the outside of a fuel tank body in opening like, The polymerization section which the bending section extends in the direction which expands the diameter of opening from the tip of a tubed part, and has external surface parallel to the effective area of opening, It has the compression zone which compressed a part of polymerization section [at least] in the direction perpendicular to an effective area, and since the thickness of the resin member which has two or more layers which can be set to this compression zone is formed thinly, it can prevent certainly that a fuel penetrates through a resin member in opening.

[0027] Moreover, in the opening structure of a fuel tank according to claim 2, since the annular member is prepared, a tubed part and the polymerization section are supported appropriately, rigidity increases, and good seal nature can be secured.

[0028] Furthermore, in the opening structure of a fuel tank according to claim 3, since the compression zone is formed so that the circular sulcus located in the direction outside of a path of the regio oralis for dehiscence at a tubed part may be constituted, if a seal member is arranged to this, much more good seal nature is securable.

[0029] moreover, like a publication the manufacture approach of the fuel tank of this

invention to claim 4 The tubed part which extends to the method of the outside of a fuel tank body in opening at the time of the blow molding of a fuel tank body is formed. After bulging a part of tubed part [at least] on the direction outside of a path, while forming the bending section which compresses the bulge section and is bent on the direction outside of a path of opening and forming the polymerization section which has external surface parallel to the effective area of opening Since at least the part is compressed and a compression zone is formed Since the thickness of a compression zone is thinly formed even when a smooth field is not only formed in a compression zone, but the resin member which has two or more layers is used, it can prevent certainly that a fuel penetrates through a resin member in opening, and can consider as the opening structure of having good seal nature.

[0030] Furthermore, so that the part according to claim 5 which should form opening may be surrounded like If blow molding is performed in the condition of having arranged the annular member of a cross-section U shape opened on the direction outside of a path and a compression zone is formed as mentioned above Since it can fabricate where it inserted the spacer from the outside of an annular member and a tubed part and the polymerization section are supported appropriately, it has good seal nature and can consider as the opening structure appropriately and where transparency prevention of a fuel can be ensured.

[0031] Since a compression zone can constitute a circular sulcus for said compression zone when [according to claim 6] it forms in the direction outside of a path of the regio oralis for dehiscence like at a tubed part, and a seal member can be arranged to this, it can consider as the opening structure of having much more good seal nature.

[0032] Moreover, said compression zone can remove easily the covering device material according to claim 7 which may form in a tubed part inside [direction of path] the regio oralis for dehiscence like, and is saved in this case at the time of shaping.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the sectional view of 1 operation gestalt of the opening structure of the fuel tank of this invention.
[Drawing 2] It is the sectional view expanding and showing a part of opening structure of the fuel tank concerning 1 operation gestalt of this invention.
[Drawing 3] It is the top view showing a part of annular member with which the fuel tank of 1 operation gestalt of this invention is presented.
[Drawing 4] It is the sectional view of the annular member with which the fuel tank of 1 operation gestalt of this invention is presented.
[Drawing 5] It is a sectional view explaining the bulge process of opening of the fuel tank in 1 operation gestalt of the manufacture approach of this invention.
[Drawing 6] It is a sectional view explaining the pressing operation of opening of the fuel tank in 1 operation gestalt of the manufacture approach of this invention.
[Drawing 7] It is the sectional view expanding and showing a part of opening structure of the fuel tank concerning other operation gestalten of this invention.
[Drawing 8] It is the sectional view expanding and showing a part of opening structure of the fuel tank concerning the operation gestalt of further others of this invention.
[Drawing 9] It is the sectional view expanding and showing a part of opening structure of the fuel tank concerning another operation gestalt of this invention.
[Description of Notations]
1 Fuel Tank Body, Holddown Member, Po Outer Layer, Pi Inner Layer, B Interlayer, PT Multilayer Parison, 1E Tubed Part 1B Bending Section 1C Compression Zone, 1D Polymerization Section 2 Annular Member 3 Seal Member 4 Lid, 5 D1, D2 Metal Mold, SP Spacer

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[Translation done.]

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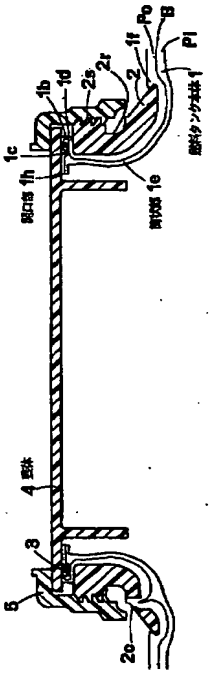
最終頁に続く

(54)【発明の名称】　燃料タンクの開口部構造及びその開口部構造を有する燃料タンクの製造方法

(57)【要約】
【課題】　複数の層を有する樹脂部材で形成する燃料タンクに関し、開口部において樹脂部材を介して燃料が透過することを確実に防止する。
【解決手段】　複数の層を有する樹脂部材をブロー成形することによって燃料タンク本体１を形成すると共に、開口部１ｈを一体的に形成する。開口部にて燃料タンク本体の外方に延出する筒状部１ｅと、この筒状部の先端から開口部を拡径する方向に折曲部１ｂが延出し開口部の開口面に平行な外面を有する重合部１ｄを形成する。そして、重合部１ｄの一部を圧縮して圧縮部１ｃを形成する。この圧縮部１ｃは、圧縮によって樹脂部材の厚さが薄くなると共に、滑らかな面となるので、良好なシール性を確保することができる。更に、圧縮部１ｃが環状溝を構成する場合にはシール部材３を配置することができる。



【特許請求の範囲】
【請求項１】　複数の層を有する樹脂部材で形成する燃料タンク本体に開口部を一体的に形成して成る燃料タンクの開口部構造において、前記開口部にて前記燃料タンク本体外方に延出する筒状部と、該筒状部の先端から前記開口部を拡径する方向に折曲部が延出し前記開口部の開口面に平行な外面を有する重合部と、該重合部の少くとも一部を前記開口面に垂直な方向に圧縮した圧縮部とを備えたことを特徴とする燃料タンクの開口部構造。
【請求項２】　前記開口部を囲繞し前記重合部及び前記筒状部に当接するように配置した環状部材を具備することを特徴とする請求項１記載の燃料タンクの開口部構造。
【請求項３】　前記圧縮部が、前記筒状部に対し前記開口部の径方向外側に位置する環状溝を構成することを特徴とする請求項１記載の燃料タンクの開口部構造。
【請求項４】　複数の層を有する樹脂部材をブロー成形して燃料タンク本体を形成すると共に、開口部を一体的に形成する燃料タンクの製造方法において、前記燃料タンク本体のブロー成形時に、前記開口部にて前記燃料タンク本体外方に延出する筒状部を形成し、該筒状部の少くとも一部を径方向外側に膨出させた後、膨出部を圧縮して前記開口部の径方向外側で折曲する折曲部を形成し、前記開口部の開口面に平行な外面を有する重合部を形成すると共に、該重合部の少くとも一部を圧縮して圧縮部を形成することを特徴とする燃料タンクの製造方法。
【請求項５】　複数の層を有する樹脂部材をブロー成形して燃料タンク本体を形成すると共に、開口部を一体的に形成する燃料タンクの製造方法において、前記開口部を形成すべき部分を囲繞するように、径方向外側に開放する断面コ字状の環状部材を配置した状態でブロー成形を行ない、前記環状部材の内側に前記筒状部を形成し、前記筒状部の前記環状部材に囲繞されない先端部を径方向外側に膨出させた後、膨出部を圧縮して前記開口部の径方向外側で折曲する折曲部を形成し、前記開口部の開口面に平行な外面を有する重合部を形成すると共に、該重合部の少くとも一部を圧縮して圧縮部を形成することを特徴とする燃料タンクの製造方法。
【請求項６】　前記圧縮部を、前記筒状部に対し前記開口部の径方向外側に形成することを特徴とする請求項４又は５記載の燃料タンクの製造方法。
【請求項７】　前記圧縮部を、前記筒状部に対し前記開口部の径方向内側に形成することを特徴とする請求項４又は５記載の燃料タンクの製造方法。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、燃料タンクの開口部構造及びその開口部構造を有する燃料タンクの製造方法に関し、特に複数の層を有する樹脂部材をブロー成形して燃料タンク本体を形成すると共に、開口部を一体的に形成する燃料タンクの開口部構造及びその製造方法に係る。
【０００２】
【従来の技術】自動車等に搭載される燃料タンクにおいては、樹脂化が進み、樹脂部材をブロー成形して燃料タンク本体を形成すると共に、開口部を一体的に形成する方法が普及し、所望の構造の開口部を有する樹脂製の燃料タンクが普及している。このような燃料タンクの開口部構造に関しては、例えば実開平４－７９２５号公報に開示されており、その第３図に従来の構造が記載され、その第１図に開口周壁の高さを抑えた構造が記載されている。同公報においては、タンク本体に接合した蓋取付基部にナット等の係合部を設け、これにボルト等の係合部品を係合させて蓋をタンク本体に固定する構造とすることにより、限られた全高に対して十分大きな容量を確保し得るとしている。また、特許第２９０６７０１号公報にも従来技術として上記公報に記載のものと同様の構造が記載されている。
【０００３】一方、燃料タンクを構成する樹脂部材に関しては、例えば実開昭６１－８３５０９号公報に記載のように複数の層を有する樹脂部材が用いられている。同公報には、接着剤層を介して複数枚の構成材を張り合わせた多層の板部材を用いた多層ブロー成形タンクが開示されている。
【０００４】
【発明が解決しようとする課題】上記実開昭６１－８３５０９号公報に記載のように、樹脂製の燃料タンクを製造する場合には、複数の層を有する樹脂部材が用いられる。これは、燃料タンクとしての強度を保持する高密度ポリエチレン等の強度保持部材と、燃料の透過を防止するバリア材とを接着剤等によって接合したもので、この樹脂部材をブロー成形することによって燃料タンクが形成され、開口部も同時に形成される。そして、開口部は前掲の公報に記載のように蓋体で覆うことになるが、開口部の端面は複数の層がタンク本体内に露呈する場合がある。この場合には、樹脂部材の最外層の強度保持部材を介して燃料が外部に漏洩するおそれがある。
【０００５】前掲の実開平４－７９２５号公報においては、パッキンを介装してボルト等の係合部品で結合することが提案されているが、蓋体の接合に際し、別途シール性の高いパッキンやボルト等が必要となる。しかも、透過防止機能に優れたパッキンを用いたとしても、樹脂部材の最外層を介した燃料の漏洩が懸念される。
【０００６】そこで、本発明は、複数の層を有する樹脂部材で形成する燃料タンクに関し、開口部において樹脂部材を介して燃料が透過することを確実に防止し得る燃料タンクの開口部構造を提供することを課題とする。
【０００７】また、本発明は、複数の層を有する樹脂部材をブロー成形して燃料タンク本体を形成すると共に、

開口部を一体的に形成する燃料タンクの製造方法において、燃料の透過防止を確実に行ない得る開口部構造を有する燃料タンクの製造方法を提供することを別の課題とする。

【０００８】

【課題を解決するための手段】上記の課題を解決するため、本発明の燃料タンクの開口部構造は、請求項１に記載のように、複数の層を有する樹脂部材で形成する燃料タンク本体に開口部を一体的に形成して成る燃料タンクの開口部構造において、前記開口部にて前記燃料タンク本体外方に延出する筒状部と、該筒状部の先端から前記開口部を拡径する方向に折曲部が延出し前記開口部の開口面に平行な外面を有する重合部と、該重合部の少くとも一部を前記開口面に垂直な方向に圧縮した圧縮部とを備えることとしたものである。従って、前記重合部の全面に亘って前記圧縮部としてもよい。

【０００９】更に、請求項２に記載のように、前記開口部を囲繞し前記重合部及び前記筒状部に当接するように配置した環状部材を具備することとしてもよい。前記圧縮部は、請求項３に記載のように、前記筒状部に対し前記開口部の径方向外側に位置する環状溝を構成することとしてもよい。そして、前記環状溝にシール部材を配設するとよい。

【００１０】また、本発明の燃料タンクの製造方法は、請求項４に記載のように、複数の層を有する樹脂部材をブロー成形して燃料タンク本体を形成すると共に、開口部を一体的に形成する燃料タンクの製造方法において、前記燃料タンク本体のブロー成形時に、前記開口部にて前記燃料タンク本体外方に延出する筒状部を形成し、該筒状部の少くとも一部を径方向外側に膨出させた後、膨出部を圧縮して前記開口部の径方向外側で折曲する折曲部を形成し、前記開口部の開口面に平行な外面を有する重合部を形成すると共に、該重合部の少くとも一部を圧縮して圧縮部を形成することとしたものである。

【００１１】更に、本発明の燃料タンクの製造方法は、請求項５に記載のように、複数の層を有する樹脂部材をブロー成形して燃料タンク本体を形成すると共に、開口部を一体的に形成する燃料タンクの製造方法において、前記開口部を形成すべき部分を囲繞するように、径方向外側に開放する断面コ字状の環状部材を配置した状態でブロー成形を行ない、前記環状部材の内側に前記筒状部を形成し、前記筒状部の前記環状部材に囲繞されない先端部を径方向外側に膨出させた後、膨出部を圧縮して前記開口部の径方向外側で折曲する折曲部を形成し、前記開口部の開口面に平行な外面を有する重合部を形成すると共に、該重合部の少くとも一部を圧縮して圧縮部を形成することとしてもよい。

【００１２】前記圧縮部は、請求項６に記載のように、前記筒状部に対し前記開口部の径方向外側に形成しても、請求項７に記載のように、前記筒状部に対し前記開口部の径方向内側に形成してもよい。

【００１３】

【発明の実施の形態】以下、本発明の望ましい実施形態を図面を参照して説明する。図１は本発明の燃料タンクの開口部構造の一実施形態を示すもので、その一部の断面を図２に示している。本実施形態の燃料タンクは、複数の層を有する樹脂部材をブロー成形することによって燃料タンク本体１が形成されると共に、開口部１ｈが一体的に形成されるが、製造方法については後述する。

【００１４】先ず開口部１ｈ近傍の構成を説明すると、図１及び図２に示すように、開口部１ｈにて燃料タンク本体１の外方に延出する筒状部１ｅと、この筒状部１ｅの先端から開口部１ｈを拡径する方向に折曲部１ｂが延出し開口部１ｈの開口面Ｓｈに平行な外面を有する重合部１ｄが形成されている。そして、重合部１ｄの一部が圧縮され、圧縮部１ｃが形成されている。尚、図１においては燃料タンク本体１を構成する樹脂部材のハッチングを省略している。

【００１５】図２に拡大して示すように、燃料タンク本体１を構成する樹脂部材は、強度保持部材で形成された外層Ｐｏ及び内層Ｐｉとの間にバリア材で形成された中間層Ｂが介装され、これらが接着性樹脂で接合された複数の層を有する多層構造の樹脂部材である。本実施形態で用いられる強度保持部材としては、超高分子量（高密度）ポリエチレンが用いられ、バリア材としては、例えばＥＶＯＨ（エチレンとビニルアルコールが共重合した樹脂）が用いられる。尚、本発明においてはこれらの材料を限定するものではなく、バリア材としては、ガソリン等の燃料の透過を確実に防止し得るガスバリア性を有する材料であれば、どのようなものでもよい。

【００１６】図２に拡大断面を示すように、折曲部１ｂは内側（開口側）に折曲されているので、仮に燃料が内層Ｐｉを透過しても折曲部１ｂのバリア層Ｂで適切に遮断される。そして、圧縮部１ｃは環状溝を構成し、特に外層Ｐｏの厚さが筒状部１ｅのそれに比し、かなり薄く形成されている。このように、外層Ｐｏの厚さは圧縮部１ｃで薄くなっており、流路が狭くなっているので、燃料が開口端面１ｐから透過する際の抵抗となる。これに対し、圧縮部１ｃを有さない開口部構造においては、多層構造の樹脂部材の開口端面（図２の１ｐに相当）がそのまま外部空間と連通し得るので、たとえ蓋体４と固定部材５との間にシール部材が配設されたとしても、外層Ｐｏを介して燃料が透過するおそれがある。本実施形態では、理論的には、開口端面１ｐ側から外層Ｐｏを介して、しかも圧縮部１ｃの薄い部分を介して折曲部１ｂに到達し得ることになるが、実際には極く僅かであり、実質的に無視し得る量である。

【００１７】更に、環状部材２が開口部１ｈを囲繞するように配置され、内側が筒状部１ｅの外側面に当接すると共に、上端面が重合部１ｄの下面に当接するように固

着されている。環状部材２も樹脂製で、径方向外側に開放するコ字状断面を有し、図３及び図４に示すように形成されている。即ち、外周に凹部２ｒが形成され、軸方向の両端面は平行に形成されている。尚、図４の上部外側面には螺子部２ｓが形成されており、図３に明らかなように全周に亘って軸方向に開口する複数の連通孔（代表して２ｃで表す）が形成されている。

【００１８】このように構成された環状部材２が、図１及び図２に示すように開口部１ｈを囲繞し、筒状部１ｅ及び重合部１ｄに当接するように配置され、外層Ｐｏに一体的に接合されている。即ち、成形時に樹脂部材が連通孔２ｃ内に侵入し、筒状部１ｅに対して回転しないように固定されている。また、環状部材２の外周端部の一部を覆うように外層Ｐｏが延出して係止部１ｆが形成されている。

【００１９】上記のように構成された開口部１ｈにおいて、圧縮部１ｃは環状溝を構成しているので、図１に示すように圧縮部１ｃにゴム等の環状のシール部材３を収容し、その上に蓋体４を載置した後、内側に螺子部を有する環状の固定部材５を装着し、環状部材２の螺子部２ｓに螺合すれば、蓋体４がシール部材３を介して重合部１ｄの上面に密着するように固定される。このとき、環状部材２は筒状部１ｅに対して回転しないように固定されているので、固定部材５を螺合する際に回転することはない。

【００２０】而して、本実施形態の燃料タンクの開口部構造においては、構造的に燃料タンク内の燃料が外部と連通し得る部分は、シール部材３と蓋体４及び重合部１ｄとの当接部、及び多層構造の樹脂部材のうちの外層Ｐｏであって、圧縮部１ｃにて薄く形成された部分のみとなるので、燃料の透過を確実に防止することができる。特に、圧縮部１ｃの底面は圧縮によって面粗度が向上し滑らかな面となっているので良好なシール性を確保することができる。

【００２１】図５及び図６は、上記の開口部構造を有する燃料タンクの製造工程の一例を説明するもので、先ず図５の成形工程において、前述の多層構造の樹脂部材で構成された多層パリソンＰＴが金型Ｄ１，Ｄ２内に配置される。図５に２点鎖線で示すように、金型Ｄ１は金型Ｄ２に対して図５の上下方向に移動可能に指示され、内側には夫々凸部Ｄ１ｒ，凹部Ｄ２ｒが形成されている。凸部Ｄ１ｒは図２に示す圧縮部１ｃを形成し得る形状に形成され、凹部Ｄ２ｒは環状部材２を収容し得る形状に形成されている。更に、金型Ｄ１の軸（即ち、開口部１ｈの軸）に対して垂直方向に進退可能にスペーサＳＰが配置され、圧縮工程時には、環状部材２の凹部２ｒ内にて、環状部材２を保持し得るように機能する。尚、スペーサＳＰは、金型Ｄ１の移動に追従して金型Ｄ１の軸に垂直な方向に移動するように構成されている。そして、別途、連通管（図示せず）を介して、多層パリソンＰＴの内側に空気圧又は液圧が付与されるように構成されている。

【００２２】而して、多層パリソンＰＴ内に空気圧又は液圧が付与されつつ、金型Ｄ１が金型Ｄ２に対して摺動し、環状部材２方向に駆動される。同時に、金型Ｄ１の移動に追従してスペーサＳＰが金型Ｄ１の軸に対して垂直な方向に駆動され、環状部材２の凹部２ｒ内にて保持される。この結果、図５に示すように多層パリソンＰＴが膨出すると共に、環状部材２に当接する部分の膨出が抑制されて筒状部１ｅが形成される。更に、図６に示すように、折曲部１ｂ及び重合部１ｄが良好な形状精度で形成される。また、金型Ｄ１の凸部Ｄ１ｒによって重合部１ｄが圧縮されて圧縮部１ｃが形成される。尚、このとき蓋部１ｇも形成されるが、これは後に除去される。

【００２３】図７は、本発明の他の実施形態に係る燃料タンクの開口部構造を示すもので、重合部１ｄの全面に亘って圧縮し、重合部１ｄ全体を圧縮部としたものである。このように構成することにより、重合部１ｄの外面（図７の上面）の面粗度が向上し滑らかな面となるので良好なシール性を確保することができ、更に蓋体３の裏面の面粗度が適切であれば、別途シール部材を介装することなく良好なシール性を確保することができる。

【００２４】図８は、本発明の更に他の実施形態に係る燃料タンクの開口部構造を示すもので、上方に突起２ｔが形成された環状部材２を備えており、重合部１ｄが圧縮されると重合部１ｄの下面に圧縮部１ｃｕが形成される。これにより、外層Ｐｏの厚さは圧縮部１ｃｕで薄くなり、流路が狭くなるので、燃料が開口端面１ｐから透過する際の抵抗となる。また、圧縮部１ｃｕ上方の重合部１ｄの外面（図８の上面）の面粗度が向上し滑らかな面となるので良好なシール性を確保することができる。

【００２５】図９は、本発明の図８の実施形態に対し、成形時に残置される蓋部材１ｇの除去を容易に行ない得るようにした燃料タンクの開口部構造を示すもので、圧縮時に、開口部１ｈの径方向内側の重合部１ｄ上面に圧縮部１ｃｉが形成される。このように薄くなった圧縮部１ｃｉ部分に剪断力を付与することにより、蓋部材１ｇを容易に除去することができる。

【００２６】

【発明の効果】本発明は上述のように構成されているので以下の効果を奏する。即ち、本発明の燃料タンクの開口部構造においては、請求項１に記載のように、開口部にて燃料タンク本体外方に延出する筒状部と、筒状部の先端から開口部を拡径する方向に折曲部が延出し開口部の開口面に平行な外面を有する重合部と、重合部の少くとも一部を開口面に垂直な方向に圧縮した圧縮部とを備えており、この圧縮部における複数の層を有する樹脂部材の厚さが薄く形成されているので、開口部において樹脂部材を介して燃料が透過するのを確実に防止することができる。

【００２７】また、請求項２に記載の燃料タンクの開口部構造においては、環状部材が設けられているので、筒状部及び重合部が適切に支持されて剛性が増大し、良好なシール性を確保することができる。

【００２８】更に、請求項３に記載の燃料タンクの開口部構造においては、圧縮部が、筒状部に対し開口部の径方向外側に位置する環状溝を構成するように形成されているので、これにシール部材を配置すれば一層良好なシール性を確保することができる。

【００２９】また、本発明の燃料タンクの製造方法は、請求項４に記載のように、燃料タンク本体のブロー成形時に、開口部にて燃料タンク本体外方に延出する筒状部を形成し、筒状部の少くとも一部を径方向外側に膨出させた後、膨出部を圧縮して開口部の径方向外側で折曲する折曲部を形成し、開口部の開口面に平行な外面を有する重合部を形成すると共に、その少くとも一部を圧縮して圧縮部を形成することとしているので、圧縮部に平滑な面が形成されるだけでなく、複数の層を有する樹脂部材を用いた場合でも、圧縮部の厚さが薄く形成されるので、開口部において樹脂部材を介して燃料が透過するのを確実に防止し、良好なシール性を有する開口部構造とすることができる。

【００３０】更に、請求項５に記載のように、開口部を形成すべき部分を囲繞するように、径方向外側に開放する断面コ字状の環状部材を配置した状態でブロー成形を行ない、上述のように圧縮部を形成することとすれば、環状部材の外側からスペーサを挿入し筒状部及び重合部を適切に支持した状態で成形することができるので、良好なシール性を有し、燃料の透過防止を適切且つ確実に行ない得る開口部構造とすることができる。

【００３１】前記圧縮部を、請求項６に記載のように筒状部に対し開口部の径方向外側に形成した場合には、圧縮部が環状溝を構成し、これにシール部材を配置することができるので、一層良好なシール性を有する開口部構造とすることができる。

【００３２】また、前記圧縮部は、請求項７に記載のように筒状部に対し開口部の径方向内側に形成してもよく、この場合には成形時に残置される蓋部材を容易に除去することができる。

【図面の簡単な説明】

【図１】本発明の燃料タンクの開口部構造の一実施形態の断面図である。

【図２】本発明の一実施形態に係る燃料タンクの開口部構造の一部を拡大して示す断面図である。

【図３】本発明の一実施形態の燃料タンクに供する環状部材の一部を示す平面図である。

【図４】本発明の一実施形態の燃料タンクに供する環状部材の断面図である。

【図５】本発明の製造方法の一実施形態における燃料タンクの開口部の膨出工程を説明する断面図である。

【図６】本発明の製造方法の一実施形態における燃料タンクの開口部の圧縮工程を説明する断面図である。

【図７】本発明の他の実施形態に係る燃料タンクの開口部構造の一部を拡大して示す断面図である。

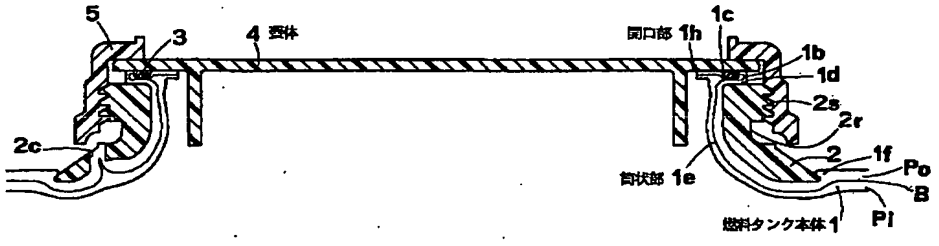
【図８】本発明の更に他の実施形態に係る燃料タンクの開口部構造の一部を拡大して示す断面図である。

【図９】本発明の別の実施形態に係る燃料タンクの開口部構造の一部を拡大して示す断面図である。

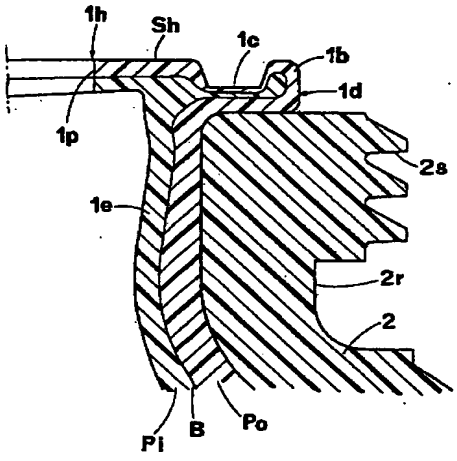
【符号の説明】

１　燃料タンク本体，　１ｅ　筒状部，　１ｂ　折曲部，　１ｃ　圧縮部，１ｄ　重合部，　２　環状部材，　３　シール部材，　４　蓋体，５　固定部材，　Ｐｏ　外層，　Ｐｉ　内層，　Ｂ　中間層，ＰＴ　多層パリソン，　Ｄ１，Ｄ２　金型，　ＳＰ　スペーサ

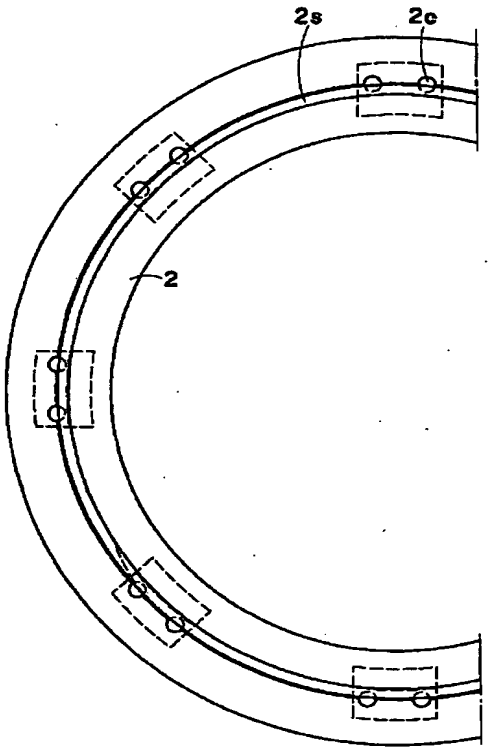
【図１】



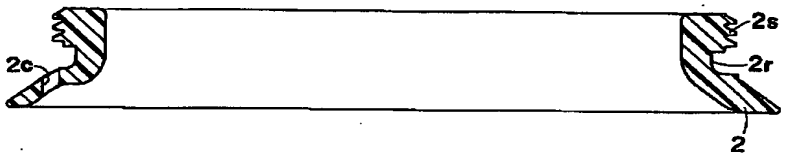
【図２】


1h
Sh
1c
1b
1d
1p
2s
1e
2r
2
Pi
B
Po

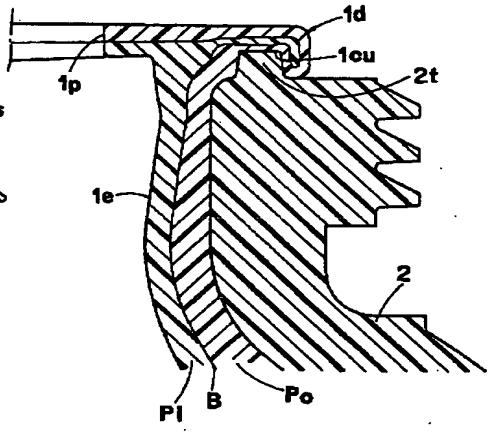
【図３】


2s
2c
2

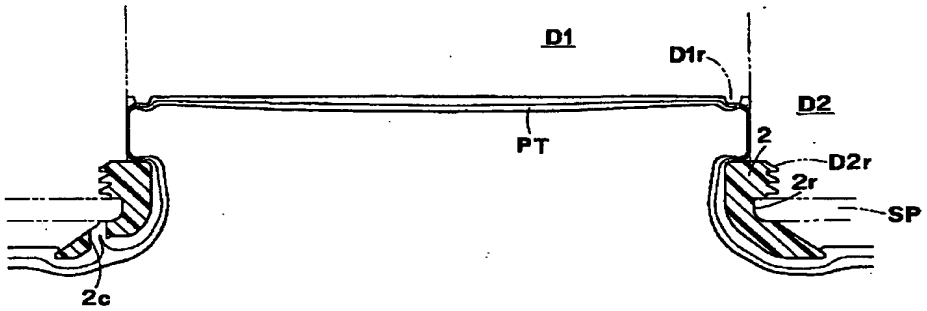
【図４】


2c
2s
2r
2

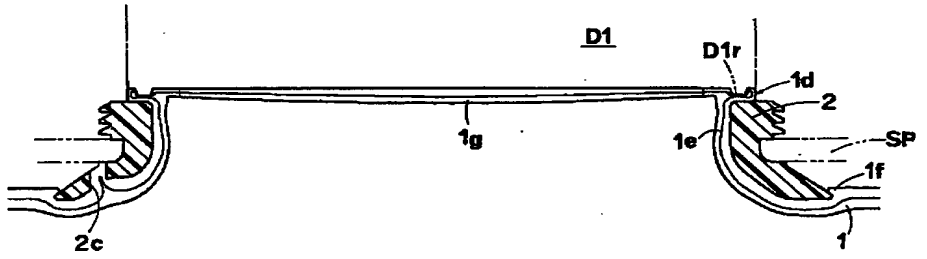
【図８】


1d
1cu
1p
2t
1e
2
Pi
B
Po

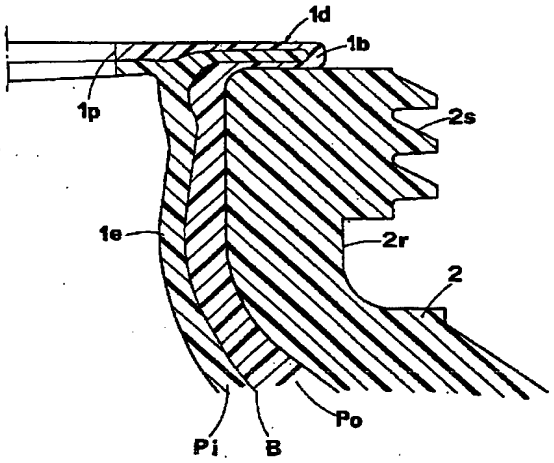
【図５】


D1
D1r
D2
2
PT
D2r
2r
SP
2c

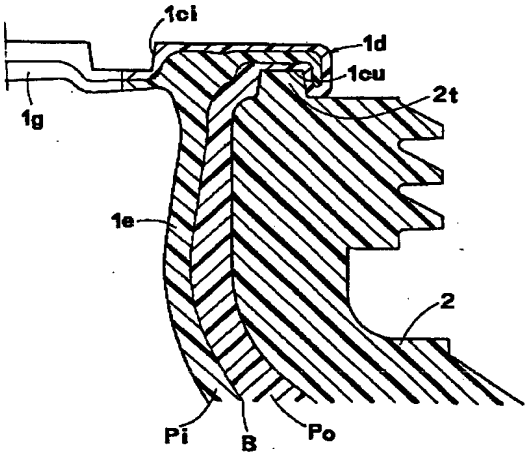
【図６】


D1
D1r
1d
2
1g
1e
SP
1f
2c
1

【図７】


1d
1b
1p
2s
1e
2r
2
Po
Pi
B

【図９】


1ci
1d
1cu
2t
1g
1e
2
Pi
B
Po

フロントページの続き

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AG23 AG28 AH55 LA01 LA08
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LG38 LH02 LH18 LJ08 LW01
LW26